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Reinterpreting Tradition to Digitalize: Framing the Design DNA of LEGO House

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Abstract: In this paper, we study how designers reinterpret the framing of previous successful products and new digital products to design products that make sense of new technologies. Through an in-depth case study of the 'City Architects' attraction in LEGO House, we provide insights into the process of reinterpreting a firm's design tradition, their core design DNA, to reframe it and renew in light of digitalisation. The study illustrates how designers: 1) analyse the firm's past successful products to frame the core design DNA, 2) reframe outdated elements of the core design DNA, 3) identify the framing of digital aspirational products and 4) reframe principles of digital aspirational products to update the core design DNA. As such, the study contributes to design and innovation research by displaying how the design process may be understood as a reinterpretation where a firm's past products and aspirational technology products are framed and reframed.

Keywords: framing: tradition: reinterpretation: design dna

1. Introduction

Firms today recognize that they must be attentive to technological progress to remain relevant (Christensen, 2013). Typically, designers are already aware of recent technologies; that are due to launch or achieve mainstream usage in the near future. Indeed, technological progress, such as digitalization, three-dimensional (3D) printing, virtual reality, drones, artificial intelligence, robotics, the Internet of Things etc., comes as no surprise to them. At the present time, numerous technologies exist that are readily developed and widely known, although their respective usefulness and relevance remain to be discovered. Hence, designers need to figure out, how such technologies may make sense.

While many studies look at how to search for new knowledge, such as new technologies, when creating new product innovations (Argote, 2012; Christensen, 2013), as old knowledge may become obsolete and not reflect the current contexts needs and expectations (Sorebsen and Stuart, 2000). We argue many designers, often already are familiar with



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new technologies, their challenge is rather to figure out how such technologies make sense for exactly their firm. In other words, the firm specific design and interpretation of new technologies. We build on the research on 'innovation through tradition', to argue that firms need to build on and innovate from their tradition, when embracing new aspects, such as digitalization (Masis et al. 2016; Messeni, Petruzzelli & Albino, 2014). Take as an example LEGO, a toy company, which specialises in designing creative building bricks sets. It comes as no surprise to LEGO that kids are spending an increasing amount of time in digital universes. Their imperative challenge is to figure out, how to design a LEGO product, that interpret and adopts digitalisation in a LEGO way. Thus, a key challenge for designers is not simply to gain new knowledge of e.g. new technologies, but to figure out how to integrate it into the firms' tradition.

To study how designers reason to reinterpreted, we tend to framing theory. Prior research shows, how framing is key in the way designers process, synthesize and make sense of observations, inputs and new aspects (Beckman and Barry, 2007). While several studies have worked with how to frame and reframe the problem (Dorst, 2015) or different dimensions of the product concept, such as the problem, experience, technology, interaction or expression (Haase and Laursen, 2018) we suggest looking back and framing the firms design tradition, may be central basis for a meaningful reinterpretation of new technologies. Coupling the 'innovation through tradition' with the 'framing' literature, we build a theoretic model, that propose framing as a reflective device to capture firms' design tradition, and reinterpret it in light of new technological developments. The model proposes framing firms 'traditional' or typical design principles - the design DNA - may be foundation for making sense of new technologies.



Figure 1 Left, LEGO House, Denmark. Middle, right, City Architects (Lego House Media, 2018, own shots)

Empirically, we research this through a close longitudinal case study at the LEGO Group. The product of study is the newly developed LEGO House (Figure 1), which has been acknowledged by the LEGO organization itself, as exemplary in how it adopts and bring meaning to new technologies. More specifically, we did an indepth examination of how the framing of the 'City Architects' attraction, as the 'City Architects' have been recognized by

the LEGO organization itself, as iconic for LEGO House and exemplary in how it makes sense of digital technologies. We did observations, interviews and workshops to understand, how design experts at LEGO worked with framing the Design DNA of past LEGO products as well as digital aspirational products, to design 'City Architects'.

2. Theory

2.1 Reinterpreting Tradition

While much research on 'how to search, and integrate knowledge in design and innovation' are biased to focus on novelty, to avoid rigidity, fixation and path dependence etc. Recent studies suggest knowledge from a firm's tradition, may be an equally important source of innovation (Katila and Ahuja, 2002; Nerkar, 2003; Massis et al. 2016). Knowledge pertaining to the firm's history, its tradition, is in fact recognized as an imperative, powerful and inimitable innovation parameter (Messeni Petruzzelli and Albino, 2014). Tradition may be defined as the knowledge, signs, values, beliefs, competencies, materials and production processes pertaining to the past (Messini Petruzzelli and Albino, 2012). In this study, we focus on the design side of tradition, more specifically the design reasoning. We build on and extend the recent studies on 'innovation through tradition', that calls for more knowledge on 'why the past can be valuable and how managers can leverage it to innovate.' (Massis et. al. 2016, p 94).

Past research suggests two key activities or challenges for innovating through tradition, respectively the interiorisation and reinterpretation of tradition. Interiorisation refers to the sharing and assimilation of knowledge pertaining to the firm's tradition. Whereas reinterpretation focus on the selection and combination past knowledge with new technologies (Massis et. al. 2016, p 94). While recent research has provided an understanding of the overall process of innovating through tradition, we go more into depth with the activity of reinterpreting. As, we are interested in understanding how designers reinterpret tradition and use it to make sense of new technologies.

2.2 Reinterpretation and Framing

To study the reasoning level of designers' reinterpretation process, we draw on framing theory. The concept of framing has been discussed in various fields of research (Goffman, 1974; Schön and Rein, 1994; Kahneman and Tversky, 1984). Across the various disciplines, framing is commonly recognized as a cognitive and communicative interpretative device, which at its core concerns "separating that which deserves focus from that which does not". (Clegg, Kornberger, and Pitsis, 2015). It is a boundary-setting move, whereby decisions are made as to what makes sense. When people frame they "consciously or unconsciously structure a situation by selecting relevant features: what is important and what is less important" (Hey, Joyce, and Beckman, 2007). Framing both describes and perceptually transforms given situations. A psychology experiment, for example showed how, when

framed differently, essentially identical options lead to different evaluations, different interpretations, and in the end, different decisions (Kahneman and Tversky, 1984). Frames represent and reveal underlying structures of belief, perceptions and priorities (Schön and Rein, 1994). In their essence, frames allow us to see things through a certain lens, they allow us to reinterpret.

In the field of innovation and design, several contributions have rendered the interpretative attributes of framing more explicit. For instance, Hey, Joyce, and Beckman (2007) showed how frames can be operationalized with elements such as the desired goal, the prioritization of relevance, the boundaries, and the evaluation criteria. Dorst (2015) captured how designers reinterpret problem by framing. Schön (1983) proposed that generative metaphors were central in expressing frames, since it is not only physical attributes that are relevant, but also the interpretative pictures or images of what could be. As metaphors provide a richer understanding for an interpretation, that allows for communicating, reasoning, reflecting, and transforming (Simmons, 2006). A recent study by Haase and Laursen (2019) in fact showed how frames are indeed interpretative in the sense they convey, the inherent logic of a product. Building on Dorst (2015) they showed how frames in their essence, connects an *insight* (into the market, user technology) to an *aspiration or vision* (e.g., of what needs to be changed), as well as how such an aspiration can be achieved and made real through a number of *situated working principles* (Figure 2).

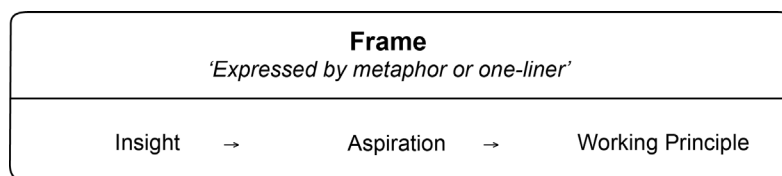


Figure 2 Frame: The connection between insights, aspirations, and working principles

2.3 Tradition: Framing the Design DNA

Research shows how frames are instrumental in the design process. While frames are often discussed as vaporizing entities, that is, devices used to attack a problem during the design or innovation process, studies suggest that every product, every firm, every design in fact, holds a number of inherent frames (Haase and Laursen, 2018). These are visible and inherent in the final concept, e.g. Steve Jobs' sunflower frame for the iMac or Motorola's pebble frame. These frames, that are embedded and evident in the final product design, we collectively label the design DNA.

The design DNA can be defined as a set of core frames that explicitly capture and reveal the focus and background of the design, serving as a guide for the visions and decisions embedded within the products (Haase and Laursen, 2019). The design DNA explicitly captures the conceptual structure of the product. It is the design DNA that makes a product *feel* and *appear* like a LEGO product, or an Apple product, or a BMW product. It explains the expression, experience, interaction, market positioning, and technology of the product. In

fact, the “underlying structures of belief, perception and appreciation” of a design represent the collection of frames that express the design DNA (Haase and Laursen, 2018). A recent study shows while the design DNA in new companies is created from scratch, in consolidated companies the development of the design DNA is based on a balance between renewing frames and re-applied frames from the companies’ tradition (Laursen and Haase, 2018).

Building on literature on framing and innovation through tradition, we make a model of the reinterpretation of the design DNA. We use frames as an analytical device to understand and make tacit interpretative elements of the design process explicit. We connect this to the recent studies, that suggests knowledge pertaining to a firm’s past, their tradition may be an important element for reinterpretation, which both includes tradition as well as new knowledge (Massis et. al. 2016, p 94). We gather these dimensions in a two-by-two matrix, which respectively move between how designers frame and reframe past knowledge from the firm’s tradition, as well as frame and reframe new knowledge of up-to-date technologies (Table 1).

Table 1 Reinterpretation tradition and technologies

	Tradition	New Technologies
Framing	Core DNA	Aspirational DNA
	Framing the firm’s tradition in terms of the core design DNA	Framing new aspirational product designs (e.g. from digital products)
Reframing	Reinterpretation of Core DNA	Reinterpret Aspirational DNA
	Identifying and reframing outdated core DNA frames to match the territorial domain.	Reframing new aspirational design DNA to match to the updated core DNA.

3. Methodology

The in-depth case study was chosen to accommodate an audience of experienced researchers, experts and practitioners within design and innovation. Where beginners would benefit from a rule-based knowledge, an expert audience use cases as a central learning element (Flyvbjerg, 2001). In fact, experts and experienced practitioners operate on the basis of intimate knowledge of several thousand concrete cases (Flyvbjerg; 2006). Hence, the ambition of this article was to create an in-depth and contextually elaborate case study, which could be added to the expert audiences’ knowledge base.

3.1 Case selection

Then, in order to identify a case that would be appropriate for an expert knowledge base, a highly strategic case selection was applied. We selected both an atypical and to some extent extreme case in respect to innovation through tradition. We chose to do a case study at LEGO, which is one of Denmark’s oldest family-owned companies. To date, the company has sold over 400 billion LEGO bricks worldwide, most of them with a clear reference (and

physical linking possibility) to the first plastic bricks that was created in the 1940s. Hence, LEGO has a significant experience in innovating through tradition.

Another reason for selecting LEGO as a case company, is that they are in an industry, where the pressure from digitalization is particularly present. Like many other toy companies, LEGO are right now confronted with a growing competition from digital universes and devices, that consume larger and larger chunks of children's time. This means that LEGO must be able to compete with digital experiences, such as Minecraft, and Netflix, in the fight for children's attention. Therefore, the focus and urgency of embracing digitalization and innovating based on their traditions in LEGO is highly present.

Within LEGO we also selected a rather extreme case, when it comes to family involvement, which is highly relevant when studying tradition (Massis et al. 2016). We selected a project that was originated by head of the LEGO family and former chairman of the board, Keld Kirk Kristiansen. He had vision to create a brand and experience house, which was designed to reflect the "magic" of the LEGO universe. His vision turned into the LEGO House project and the family was highly involved all the way throughout its development. LEGO house is a brand and experience house, which is regarded by The LEGO Group itself as a prime example of how to integrate new technologies and digitalization while staying true to their traditions. The LEGO house was also an atypical case because it had a longer projected lifespan than most of LEGO's individual products and a different financial setup.

3.2 Research setup

The quality and depth of the collected data plays a significant role, when it comes to building a case-study that will be both relevant and useful to an expert audience. In this project there were a number of factors that secured this. First, the in-depth case-study of the LEGO house was an extension of a larger industry research project. This provided a significant contextual understanding of LEGO and helped in ensuring depth in the data collection for the case study. Furthermore, the research setup drove for intense and extensive interaction between the researchers and the informants, involving for instance bi-weekly, face-to-face meetings over a period of half a year, alongside formal presentations, email exchanges, dinners, etc. This resulted in an informal atmosphere, that was highly beneficial because this allowed a high level of detail and unfiltered discussions in regards to the LEGO house case. Finally, the informants included only long-term LEGO employees. This ensured deep knowledge of LEGO's traditions as well as hands on experience with conceptual development at LEGO. Two of the employees had been involved in conceptualizing and developing the LEGO House from its very beginning in 2013, where only a handful of employees were involved.

In order to provide sufficient concrete depth and detail, we chose to anchor this paper in one of the main experiences at the LEGO House called City Architects. City Architects is a platform located on a table, onto which children can place different buildings. The buildings are mainly created from white LEGO bricks combined with red, blue, yellow, or green bases to signify different kinds of functions (shopping, recreational, industrial, and domestic). On

the platform, a digital projection adds small LEGO people who are running around the city, looking for buildings that match their colour. When a child places his or her building onto the platform, a projection from above acknowledges the new building by issuing a “ta-da” sound, and new roads, parks, and trees are created around the building on a digital layer. If a child places a white house built on a blue base onto the platform, the small blue LEGO people will start running toward that house, and the child will soon realize what kinds of houses are missing from the city and, thus, what is needed next. This digital layer provides instant gratification and emphasizes the child’s experience of having created an expansion to the city. The child takes part in the creation of a shared and highly dynamic city with all the other children present.

3.3 Data collection

Whereas the industry project provided the contextual basis for the case-study, a number of research initiatives was taken to collect data directly for the case study. These activities included: interviews with key employees, presentations of the LEGO house development; a guided tour throughout LEGO House (before it was opened to the public), where key employees would explain their reasoning behind the different exhibitions; and access to materials and presentations from the LEGO House development process.

Moreover, the results from two workshops, where included as well. In the workshops employees from LEGO engaged in codifying the LEGO’s design DNA as well as LEGO Houses Design DNA, making the tradition explicit. The first workshop included research informants directly related to the research collaboration, the second workshop further included employees from the LEGO Brand Group and LEGO’s front-end function. After the workshops the definitions of the LEGO design DNA and the LEGO House design DNA were turned into presentations and informational texts. In order to ensure a high level of detail and accuracy, the documentation was then passed back and forth between the researchers and the LEGO employees in an effort define it as precise as possible. Finally, this material was presented to a group of company directors.

To secure a high quality and precision in detailing of the in-depth case study, the preliminary conclusions along with any inconsistencies with respect to the LEGO house, were further explored with LEGO employees, either individually or in group sessions. And as a last step in this process, the written material presented in this paper was send to approval to the LEGO employees to ensure the accuracy of the case-study.

4. Case analysis ‘City Architects’: Reframing LEGO

The focus in the analysis has been to identify the significant moves involved in selecting and combining past and new knowledge. In more detail, we have identified, how the LEGO employees have selected and combined their knowledge about the LEGO’s tradition and combined it with knowledge about digital technologies in design.

4.1 Framing tradition: The core DNA

The first step designers and developers applied in the creation of the exhibitions in LEGO house was to frame the core design DNA. This means that they would use prior product designs, and their in-depth understanding of these, as a way to create starting point or a direction for the new solution. For instance, in the case of City Architects the designers and developer had looked very close into the LEGO city products. The city theme is a classic LEGO theme, which can be traced back to the 1960s and the idea of LEGO as a “Systems of Play.” As one of the designers explained, “City building in LEGO is big”³⁷ In the case of City Architects, the designers looked into the principles and background of LEGO City. One of the key principles in LEGO City is that “Imagination starts in reality.” Children mirror what they experience in reality into their play. As cities are part of children’s reality and children know what happens in cities, the city represents a great starting point for children’s imagination. For this reason, LEGO City originally mirrored the classic city, with its small roads, houses, gas station, grocery store etc. The framing of this original thinking is illustrated in Figure 3.



Figure 3 Frame: City building

The LEGO DNA of building cities, as well as the LEGO City products, were the starting points for exploring the possibilities that eventually became City Architects. The design DNA behind City Architects is fairly concrete, since it refers to a product category and to specific working principles.

4.2 Identifying and Reframing Tradition

The second step the designers focused on identify where the past/ present design DNA needed an update. More specifically the designers looked for working principles within core design DNA, which needed to be updated, in order to ensure that a future solution would be relevant to the users and competitive in the markets etc.

For instance, in the case of City Architects, the designers explored whether LEGO’s “city experience” was still relevant. To qualify this they did some research into: how other successful products on the market present cities to children, for example, in movies, games, and toys. During this exploration, the designers identified a different city experience to the one typically presented in the original LEGO City products. In the digital domain in particular, children are presented with cities that are fast moving, high speed, and full of changes. Where the initial city-related products offered by LEGO mirrored a small town, the city experience in the digital domain mirrors big, dynamic cities. Such cities are constantly

changing, with each new building that emerges changing the rhythm of the city. The aspiration hence became to integrate this new dynamic city experience into the LEGO City experience.

4.3 Identification of inspirational products and the design DNA behind these

The third step the designers used during the process of creating the experiences within LEGO House involved identifying aspirational products. That is products that could provide some inspiration into how the Design DNA that needed an update could be changes. This means products, that are creating the new standards and expectations in the market, and essentially is the reason why there is a need for an update.

In the case of City Architects, the designers looked especially into inspirational products from the digital domain, which represented the “dynamic city.” In particular, they looked at how games such as SimCity, which provide the “dynamic city” experience³⁸ With regard to SimCity in particular, the designers found it interesting that children were *building cities together*. They were also inspired by the continuous information on: *supply and demand of buildings* in the city, which triggered the children to continue to play. Finally, they found it intriguing that the children gained instant gratification from their actions.

As the example of the SIMcity shows the designer and developers at LEGO did not just find different solution elements, to copy, but they tried to identify the design DNA behind these, in order what kind of principles they are built on.

The working principles that were integrated into City Architects included for instance:

- Children building the city together on the platform (table).
- The dynamic city - in terms of the rapidly changing projection on the platform, which expands the city if a building is added and contracts the city if a building is removed.
- The instant feedback as to what is needed in the city in terms of the small LEGO people moving around on the platform. This is to inspire the children to create the next building in an effort to gain a reward, for instance, a concert at the stadium.
- Instant gratification obtained - in the form of a magic “ta-da” sound when the children place a building on the platform.

4.4 Development of new solutions that integrate past and new Design DNA.

The final step applied by the designers during the process of creating the experiences within LEGO House was to develop new solutions that reinterpreted new and past DNA.

When the designers updated the past design DNA they were respectful, in the sense they were very conscious of which working principles would fit the LEGO tradition. Every new solution principle was thoroughly evaluated and translated into the LEGO design DNA. For instance, in the case of City Architects, the pre-defined or pre-created houses from SimCity (and other digital games) did not fit with the LEGO design DNA. These ‘readymade’ and

fixed houses are very opposing to LEGO's tradition. Every LEGO brick represents different possibilities and essentially "endless" combinations. This offers the child the possibility to be creative and build whatever combination he or she finds interesting and intriguing. So in City Architects, children are encouraged to create whatever buildings they want, and they can explore how different ways of creating buildings work in the city context.

In the process of creating the City Architects, the updates also synthesized into new design DNA, that emerged out of the process. During the process, it became clear that the challenge in digital games and technology is that often absorb children's attention and thus leave no room for creating, playing, and building. The aspiration in city architects and Lego house, altogether therefore became to use technology to strengthen the experience when children are creating, playing, and learning. And a new design DNA slowly emerged, namely the idea of using: "a digital layer that keeps you in reality." (see Figure 3). Thus a new design DNA string is added to the original design DNA.

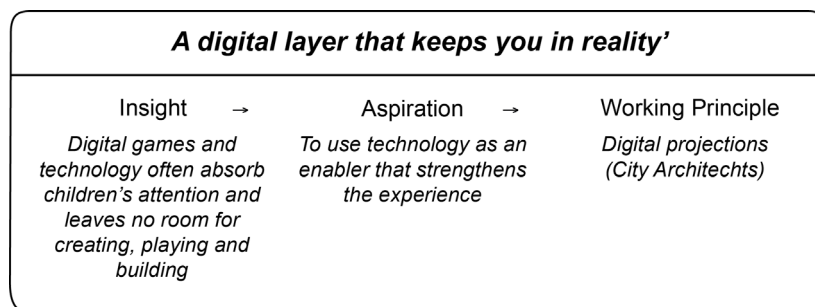


Figure 3 The new LEGO House DNA frame: A digital layer that keeps you in reality

5. Discussion

With the present paper, we have built on, and contributed to, two core discussions within the academic research, namely innovation through tradition and framing. This study extends these core discussions by linking them, and it supports the findings of a recent study suggesting that design may have the capacity to drive both relevance and consistency. We contribute to both research streams by identifying four modes of framing and reframing that designers apply to systematically frame and reframe new technologies in ways that make sense to the company they work for in order to balance the company's need for renewal (to keep up with new digital technologies and behaviours) with its need to ensure consistency (with the design DNA of the company).

When framing the core DNA, expert designers exhibit in-depth and sophisticated knowledge of the design DNA of the company they work for, as well as deep insight into the backgrounds of past products (for instance, the reasoning behind those products and how they were framed). They use this knowledge (more or less explicitly) to frame the design DNA of the company, and they then use this as the starting point for exploring new technologies. In this sense, the designers use the companies' core design DNA (for instance, DNA frames

that have been used in multiple products) to establish the foundation and direction for renewal.

When reframing core DNA, expert designers explore the extent to which the working principles inherent within the company's present products still resonate with users, the market etc. In particular, they do so by looking at the kinds of experiences and interactions offered by other technologies or digital products on the market. They do not begin by questioning the deeply rooted insights on which their products are based (i.e., in the case of LEGO, their insights on play), or their aspirations as a company, but rather they reflect upon whether the working principles are still appropriate to achieve this. They reflect on whether their design DNA still resonates, by identifying whether the solution principles still resonate.

When identifying inspirational DNA, expert designers explore other products that resonate with the market, with users etc. For instance, products that are successful, or the leading products in different markets (e.g., digital experiences or markets wherein technology is implemented in a sensemaking way). Having identified these inspirational products, the design team start to identify the working principles behind them that particularly resonate with the market, with users etc., as well as why this is the case.

When reframing aspirational DNA to secure a fit, expert designers carefully reflect on their implementation of new working principles. Even if they are highly inspired by a given product, they do not simply go ahead and implement all the working principles derived from that inspirational product. Instead, they consider each working principle with respect to the design DNA (which can be rather extensive) in order to ensure that the working principle is not contrary to any of the present design DNA, since this may challenge the consistency of the product with respect to previous products and the brand DNA. During the integration of new working principles, the expert design thinkers particularly look for working principles that may end up reinterpreting the design DNA.

This study provides practitioners with hands-on strategies for systematically making sense and integrating new technologies into a company. Furthermore, it provides important insights into how to use the concept of design DNA in order to comprehend and address the challenges associated with ensuring both renewal, in light of new technologies, and consistency with tradition.

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